report

meeting	**STREET LIGHTING SELECT COMMITTEE**	
date	**17 September 2007**	**agenda item number**

Street Lighting Scene Setting Report

Goals, Objectives and Policies for Street Lighting

1. Nottinghamshire County Council has identified the following goals in its 2006 – 2010 Strategic Plan:

   All together safer and stronger - a safer place to live with a strong sense of community

   All together better travel and access - help for people to travel more easily and safely and be able to access all the services they need.

   All together cleaner and greener - protection and improvement for the environment

2. These strategic goals are linked to following overall purpose for the street lighting asset as described in the County Council's Street Lighting Code of Practice:

   - to ensure the safety of all road users and pedestrians, reduce fear of crime and give a feeling of security to the public in the hours of darkness

3. In order to achieve the above strategic goals a number of specific objectives are identified:

   - reducing the percentage of street lamps not working as planned
   - improving the speed of response to repair street lighting faults
   - replacing dangerous/poor condition street lighting columns
   - upgrading street lighting to improve pedestrian and road user safety
   - developing a long term funding strategy for street lighting
   - reducing CO2 emissions through energy conservation, use of green energy where appropriate and use of suitable new technologies

4. There is no statutory requirement to provide street lighting, however, there is a duty to improve road safety and to combat crime. Measures

to address both these issues include the provision of street lighting for road users, pedestrians and local residents.

Inventory

5. The street lighting asset comprises lamps fixed to columns or brackets (attached e.g. to buildings) and associated equipment to light the highway footways and carriageways during the hours of darkness. The following tables give a breakdown of column material and lamp type.

District (April 2007)	Steel columns	Concrete columns	Other columns & fixings	Total no
Ashfield	11054	1746	16	12816
Bassetlaw	11215	2217	388	13820
Broxtowe	7770	3934	581	12285
Gedling	9508	2445	65	12018
Mansfield	13669	97	254	14020
Newark	10628	1109	438	12175
Rushcliffe	9955	1475	243	11673
Total	**73799**	**13023**	**1985**	**88807**

Note: 'Other' in the table above includes both other column materials and brackets and fixings for lamps attached to building and subways etc.

Lamp Type:

District (April 2007)	SON	SOX	Other	Total no
Ashfield	4666	8141	9	12816
Bassetlaw	3787	9990	43	13820
Broxtowe	2479	9626	180	12285
Gedling	2710	9293	15	12018
Mansfield	2659	11130	231	14020
Newark	3775	8284	116	12175
Rushcliffe	3254	7658	761	11673
Total	**23330**	**64122**	**1355**	**88807**

6. Before the 1980's lighting would have been predominately SOX (low pressure sodium – orange light), which are less efficient in their colour rendering properties compared to SON (high pressure sodium). While

SOX was very energy efficient the associated "bowl" or "curved" type diffuser luminaries tended to be more light polluting.

7. In addition, it should be noted that approximately 2,000 lighting units are not located on the adopted highway for which responsibility is unknown. These are recorded on the inventory because they are maintained through the highway budget.

8. There are also other lit assets in the highway including bollards and road signs, these are not included within the scope of this report.

Inventory Management

9. An inventory of columns and lamps assets are stored electronically on a bespoke lighting computer database called SLIMS (street lighting management system). This data base stores information for each district in the county and is maintained by both ourselves and our partners in the districts (MOPs); Mansfield, Ashfield and Broxtowe. The information it contains is listed below:

    - Maintenance authority
    - Column location and reference number
    - Column type and height
    - Wall mounted and other lighting unit types
    - Road name and grid reference for each unit
    - Bracket types, dimensions
    - Lamp type
    - Control gear details
    - Date of installation
    - Defect details
    - Repair history

10. All column locations are plotted on a mapped based geographic information system (GIS). It is however planned to move the street lighting inventory to the Authority's integrated highway asset management system - CONFIRM, during 2007/08.

Demands

Current Demands

11. The current demands on the Highway Lighting Asset are as follows:

    - A safely lit highway
    - Reduction in the fear of crime
    - Avoidance of light pollution
    - Cost effective lighting systems
    - Sustainable lighting systems and energy
    - Environmental surroundings, e.g. conservation areas

These demands are discussed in greater detail below.

- **A safely lit highway**

12. The highway is to be safely lit for all users with special consideration to vulnerable user groups, e.g. pedestrians, cyclists, the elderly, disabled people and children. All new street lighting must be designed and installed to the national design standard BS5489. Upgrades to street lighting are implemented to improve pedestrian and road user safety. Recent upgrades have included a programme to install 'raise and lower' (hinged) columns. These columns allow access for repair of faults in locations where it is difficult for highway equipment to access traditional columns.

13. There is a constant need for the Authority's Highway Accident Investigation Unit (AIU) to consider highway locations with accident problems. As part of schemes to address accidents in the hours of darkness, new or improved highway lighting may be implemented. Accident reduction lighting schemes are prioritised on the basis of a cost-benefit ratio calculation. It is anticipated that the demand for new or improved highway lighting to address accidents sites will continue.

14. Highway lighting will normally be provided in urban areas, but in rural areas, particularly those which are non-residential, a decision is made taking into account various factors with road safety being the most important. The reduction of night time casualty accidents is a principal aim for improving safety on the highway through lighting.

15. There is a need to continuously improve the lighting service though a quicker response to repair faulty lighting and reductions in the numbers of lamps not working as planned. Improvements are monitored through related performance indicators; BV215a and BV215b.

- **Reduction in the fear of crime**

16. Fear of crime is targeted through consultation with community groups e.g. Parish Councils, Neighbourhood Watch, the Police etc. and District Councils who are responsible for Crime and Disorder Audits. There is a small LTP budget for lighting upgrades available for fear of crime related schemes, however external funding has contributed significantly in previous years. Typically external funding sources are Neighbourhood Renewal and Coalfield Regeneration groups. As illustrated in the following table, external funding has been more difficult to secure in the last two years.

Year	NCC Upgrades Budget -£	Additional external funding -£
03/04	222,000	204,000
04/05	125,000	123,000
05/06	199,000	26,000
06/07	135,000	15,000
07/08	60,000	In Negotiation

17. The Authority also receives many requests from members of the public, Town and Parish Councils for new or upgraded street lighting. Often the reason for this is they perceive that there is a community safety issue due to an insufficient level of lighting. All requests for lighting are considered each year in the budget setting process, though of those that are considered appropriate not all are implemented due to limited funds. In 2006/2007 there were 51 justified requests, though just 18 of these – 35% could be implemented. The rest are carried forward to the following year for consideration and reprioritisation.

18. Lighting requests are prioritised annually, with priority given to schemes that can be part-funded externally. Requests for new lighting are currently prioritised using a scoring system developed by departmental officers. Increased lighting levels need to be carefully balanced against energy cost and carbon dioxide emissions considerations.

19. In crime hot spots consideration should be given to installing appropriate light sources i.e. the use of 'White Light', which gives optimum colour rendition. The minimum mounting height in of lanterns in such areas should be 6m for all new schemes. Additionally, the authority works on a partnership basis with respect to the installation of CCTV cameras on lighting columns and on the highway.

- **Avoidance of light pollution**

20. Light pollution is reduced through careful specification of lanterns. All lanterns used for street lighting must contain an acceptable optical system to direct the light onto the highway with in the limits set by European standard, for example with the new 'white light' systems rather than the old orange light where the direction of light cannot be controlled. To ensure the minimum environmental pollution to the 'night sky' the amount of downward light from the lantern should be better than 80% (output ratio). Light pollution is also limited by unobtrusive positioning of lighting columns. The Authority receives very limited reports or complaints in respect of light pollution and it is not considered to be a major problem within Nottinghamshire. Local reports of light intrusion into properties occasionally occur, but appropriate use of shields and column positioning reduces these issues to a minimum.

- **Cost effective lighting systems**

21. It is considered that cost effective lighting systems are being utilised with regard to energy consumption, lighting efficiency and capital costs. Street Lighting has recently been the subject of a value for money exercise by both internal audit and externally through "Use of Resources" exercise by the Audit Commission in terms of its revenue commitment to the service.

- **Sustainable lighting systems and energy**

22. The County Councils Strategic Plan - All Together Better 2006 -2010, commits the Authority to be greener and cleaner for the protection and improvement of the environment. Included in this is a promise to reduce CO_2 emissions through energy conservation and buying green energy. The County Councils' Carbon Management Plan details further the Authority's approach in working towards Carbon neutrality. A chapter in the plan addresses Street Lighting and identifies four key aims in its strategy for reducing carbon emissions. These are:
    - to review existing lighting levels on new developments and on renewal/ replacement schemes
    - to investigate the reduction of energy consumption by use of dimming and lighting switch offs
    - to ensure energy efficient equipment is used
    - to ensure energy from renewable sources is used where appropriate

23. A number of street lighting related actions are identified in authority's Carbon Management Plan. (An extract of the plan is attached as Appendix A) These actions are either currently being undertaken or are planned for this year. There is an action to ensure the consideration of green electricity as part of the tendering process for street lighting. In 2005/2006 electricity from a purely green energy source was purchased at no additional cost, however since then green energy costs have significantly increased. This has meant that a green option was not financially viable in the latest two year energy supply contract which commenced in August 2006; only 2.5% of the total amount was supplied from a green energy source, with the remainder on a combined heat and power (CHP) tariff. The current use of a CHP and green supply of energy allows 7000 tonnes of carbon dioxide emissions to be saved when compared to using "brown" energy sources.

24. The use of green energy and CHP will continue to be pursued in the future, though again will be considered along with its financial implications. All tendering processes for street lighting are undertaken using the expertise of the Authority's energy management staff in the Sustainability Team. It is worth noting that street lighting represents a significant source of carbon dioxide emissions from the Authority – around 15%. Such emissions are likely to feature in the new performance framework for local government, for which DEFRA have proposed indicators that includes:
    - the percentage of carbon dioxide reduction in local authority estate and operations.

- **Environmental surroundings, e.g. conservation areas**

25. The provision of lighting should take into account its surrounding, whether conservation areas, listed buildings and sites of special interest or high risk areas for example next to airfields or railways. This may effect the specification in design for lighting equipment.

Future Demands

- A growing highway lighting stock
- Increasing energy costs and need to reduce carbon dioxide emissions requiring further consideration of efficiencies including the consideration of a trial of part night lighting or dimming following guidance in ILE's "Invest to Save" document.
- Requirement to move to a risk based inventory and a new national performance indicator based on this
- Revision of the NCC Code of Practice for street lighting in light of the new ILE Code of Practice
- Moving the inventory from the SLIMS database over to 'CONFIRM' (the County's Highway Asset Management System)

These demands are discussed in greater detail below.

A growing highway lighting stock

26. Each year new lamp columns are installed in new locations. These locations are either on the existing network, for example where and there is a history of accidents and lighting has been installed as part of a scheme to reduce accidents (these schemes are promoted and funded by the Authority's Accident Investigation Unit); or on new adopted highways through Section 38 Agreements. This trend will continue in the future as new roads are built and improvements in safety on the highway are required. Lighting is particularly important for safety improvements where there are a high number of night time accidents. The increase in street lighting stock over the last two years is outlined in the table below.

	Stock	Increase	% increase
2005	86758	-	
2006	87805	1047	1.19
2007	88807	1002	1.13

Increased energy costs

27. Energy costs have increased in the last 3 years by 60% to 6.515pence/kWh in 2006/2007 from 3.917pence/kWh in 2004/2005 (this figure includes the climate change levy for non-green and non-CHP energy). This has had a significant impact on the cost of providing the Authority's street lighting and it is likely that energy costs will continue to increase in the medium term. Energy contracts were let following competitive tendering to secure best value for energy supply in line with developments in the energy supply markets. Prices are obtained for green and conventional energy across a range of fixed-term contract durations. Market prices for energy have been volatile over the last 12 months and the authority is looking to re-tender in August 2008 with Leicestershire and Derbyshire County Councils to maximise the potential for achieving reduced energy prices.

Procurement takes place on an un-metered basis using an inventory with light level detectors providing information on hours of operation.

28. The Authority must consider ways of making efficiencies to try and mitigate this rising cost, as well as meeting carbon dioxide reduction targets. The Institution of Lighting Engineers has published guidelines for saving energy in public lighting to help authorities to tackle CO_2 emissions and reduce energy bills. These guidelines – 'Invest to Save' are to be considered for future policy in relation to street lighting. One possible consideration in the future may be a reduced operation of night time lighting. For example, turning lamps off for the early hours of the morning on low priority rural routes. This is currently being trialled in Essex County Council and Nottinghamshire County Council is considering its policy in relation to this. There are a number of balancing factors when considering part-night lighting such as potential conflict with speed limits, crime and fear of crime increases and road safety implications. Any move towards part-night lighting would also require significant public-consultation. Further detailed information on part-night lighting and dimming will be made available to members of the Scrutiny Committee including detailed legal advice.

29. In additional consideration is the adjustment of the controller 'Lux' levels to reduce the period that lighting units are lit.

Requirement to move to a risk based inventory

30. The DfT are changing their inventory requirements for the 2007/2008 allocation in line with a risk based inventory. This inventory requires a considerable amount of additional of survey data to be collected for Nottinghamshire's lighting stock at a cost of £60K per year over four years. Following the data collection a much more accurate assessment of the condition of the lighting stock will be gained which will better inform prioritising the replacement and renewal programme.

Revision of the NCC code of practice for street lighting in light of the new ILE Code of Practice

31. The NCC code of practice for street lighting was last updated in 1999. In 2005 the ILE produced a new Code of Practice for street lighting. To keep up to date with current best practice NCC has commenced assessing the implications on the new Code with a view revising its Code of Practice later this year.

Moving the inventory from the SLIMS database over to 'CONFIRM' the County's Highway Asset Management System

32. The County Council has adopted a Highway Asset Management System for the management of the highway asset. The lighting asset will transfer to this system - 'Confirm' from the current SLIMS inventory during 2007/08. Business process meetings and data transfer considerations are currently taking place.

Lighting Sources and Standards

33. The majority of the current lighting in Nottinghamshire is provided by Low Pressure Sodium (SOX) technology. Most new installations are fitted with more effective High Pressure Sodium (SON) lighting technology, but so far this better quality lighting is illuminating only a minority of streets. White light technology is currently being piloted including the use of new CosmoPolis lamps designed to provide energy efficient white light illumination.

    The key characteristics of the main light sources are summarised for member's information in the following paragraphs.

- **Low Pressure Sodium (SOX) Lighting –** Approximately 72% of the lighting stock uses Low Pressure Sodium (SOX) lighting technology. SOX lighting generates a monochromatic orange glow offering very poor optical and colour rendering qualities. Despite representing old lighting technology, SOX remains the predominant light source for street lighting throughout the UK, including Nottinghamshire. While SOX light sources consume relatively low levels of electrical energy, their optical performance is poor and only about 50% of light output reaches the road surface, therefore SOX lighting is a significant source of light pollution and as such offers relatively poor energy efficiency.

- **High Pressure Sodium (SON) Lighting -** Approximately 28% of the stock uses modern High Pressure Sodium (SON) lighting technology. SON units are used mainly along principal traffic routes and in town centre areas. SON lighting is a partial spectrum light source offering an enhanced quality of "peach coloured" lighting which provides improved colour rendering and better night-time recognition than monochromatic SOX lighting. It is an easily controlled and directed light source and given an effective design solution about 70% of the light output reaches the road surface. SON lighting also has the benefit of extended lamp life.

- **White Light Sources –** White light sources are used in only a minority of streets, notably a trial of modern CosmoPolis Luminaires in Nottinghamshire to test its impact in terms of its effectiveness and public reaction. White light sources, such as the PLL and CDM/TT units offer high quality colour rendering. Research indicates that objects illuminated by white light are perceived to be brighter than those illuminated by partial spectrum (SON) and monochromatic (SOX) sources at typical street lighting levels. This effect enables white light designs to use a lower design standard category compared to an equivalent SON solution thereby enabling more energy efficient lighting designs solutions to be developed. The colour rendering properties of white light sources provides an increased sense of security, whilst facilitating improved night-time recognition. Nationally, white light sources are being used increasingly in street lighting design to assist in reducing crime and fear of crime while enhancing the night-time visual street scene during hours of darkness.

Lighting Standards

34. BS EN 13201 sets out lighting modern standards defined in terms of lighting classes for road lighting according to photometric requirements relating to visual needs of road users and environmental implications. Modern lighting technology offers good colour rendering, reduced light pollution and better night-time visibility for pedestrians, road users, local police and emergency services. It is intended to enhance street safety and security at night by reducing road accidents and by combating crime and fear of crime.

35. Current Council policies seek to achieve appropriate BS EN 13201 standards for new installations and relighting schemes taking account of traffic flows and local environmental and community safety requirements, including particular needs in Areas of Outstanding Natural Beauty, Conservation Areas, Sites of Special Scientific Interest. However, most of the current lighting stock pre-dates modern lighting design standards, in particular continued use of old Low Pressure Sodium (SOX) technology provides poor quality illumination with inferior night-time visual definition.

Routine Maintenance, Capital Replacement and Risk Factors

36. County revenue budgets are allocated mainly for maintenance and energy supply. Maintenance includes; all column assessment, bulk clean and lamp change, electrical and structural testing, fault repair and accidental damage repair. Maintenance budgets are allocated across the districts by the considering the numbers of street lighting units and column condition. Energy costs have increased significantly – by over 60% in the last 3 years putting significant pressure on this budget. Revenue budgets in recent years are shown below:

	Revenue budget		
Year	Maintenance	Energy	Total
03/04	2,658,996	1,257,904	3,916,900
04/05	2,456,580	1,053,820	3,510,400
05/06	2,695,700	2,214,400	4,910,100
06/07	2,653,000	2,731,200	5,384,200
07/08	2,562,500	2,676,000	5,238,500

37. Lights that fail prior to being changed or electrically tested are reported by officers checking priority routes on night-patrol routes fortnightly in winter and monthly in the summer. Faulty lighting may also be reported by members of the public. Remedial works are then undertaken with in the target time required of 7 days where the fault lies with County equipment (measured by BV215a).

38. Routine maintenance activities are carried out by Nottinghamshire County Council staff and staff from Mansfield, Broxtowe and Ashfield

District Councils as part of the MOPs (Manage and Operate Partnership) arrangements.

39. Difficulties have been encountered where faults lie with the Distribution Network Operator's (DNO). They have been failing to meet the required timescale of 14 days for addressing faults (measured by BV215b) resulting in an unsatisfactory service for the user. An improvement in the provision of this service is currently being sought through consultation with the DNO and liaison with the Regulator 'OFGEM'. This situation is being monitored and the Authority, through the Street Lighting Repair Select Committee, has made recommendations particularly around the performance of Central Networks and the current legal framework for DNO's in relation to street lighting repairs.

Renewal and replacement

40. Renewal and replacement work is carried out when a lamp column or element of a lamp column reaches the end of its useable life. On some occasions, usually on the critical routes of the principal network, structural testing is carried out to determine the extent of column replacement necessary. There are 88,807 county owned columns therefore an average of 2220 a year should be replaced if a 40 year life span is assumed. Many lighting columns inspected are considered to be beyond their serviceable life and/or are difficult to gain safe access to repair. A column replacement programme has been developed and is in place to address these. This programme will be further refined following collation of the new column condition 'Appendix B' inventory information and revised column risk model analysis.

41. County capital budgets for street lighting replacement had not been available for many years and the overall condition of the street lighting stock suffered due to the lack of investment. Following reports on the deteriorating condition of the asset to Cabinet, County capital allocations were made 2 years ago and have continued since then. Due to the larger capital allocations replacement of poor columns has increased significantly. Capital budgets in recent years are shown below:

Year	Capital budget
03/04	418,123
04/05	590,345
05/06	1,470,200
06/07	1,300,000
07/08	1,300,000

42. Future works are planned up to two years ahead with the final works programme being agreed and passed to Highways Operations 3 months in advance of the new financial year, enabling works to be progressed early in the financial year. Future works planned in advance are subject to change, depending on latest condition information received prior to the final works programme being set.

	Excellent	**Good**	**Average**	**Poor**	**Dangerous**	**Un-assessed**	**sum**
Bassetlaw	0	13166	550	104	0	0	13820
Ashfield	2535	6348	2516	1413	0	4	12816
Mansfield	2206	7487	4046	248	0	33	14020
Newark	1137	8675	1558	801	0	4	12175
Gedling	1518	7418	2712	361	0	9	12018
Broxtowe	550	6665	4535	418	0	117	12285
Rushcliffe	1738	7971	1272	690	0	2	11673
Totals	9684	57730	17189	4035	0	169	88807
% of stock	**10.91**	**65.01**	**19.36**	**4.53**	**0**	**0.19**	

Capital street lighting works for the NCC asset are delivered through the County's own Highways Operations Group, the Tarmac Partnership and the MOP's partners.

The above table shows current street lighting asset condition.

43. The lack of investment in street lighting historically has meant that the demand for replacement schemes remains high. Replacement schemes are ranked by the condition information available in SLIMS and with the local knowledge of the area street lighting manager. The budget holder uses this information to determine which schemes should take priority in each year's funding allocation.

44. The Authority has recently produced a life-cycle plan for Street Lighting and this identifies that with £1.3m is spent on asset replacement, this implying an average expected useful life of 68 years per lighting column on an estimated gross replacement value of £90m.

45. It is known that a lighting column ideally has a useful life of 40 years suggesting £2.2m should be spent on asset replacement each year to ensure a steady state approach. It is important that existing

levels of capital expenditure are improved so that significant deterioration of the lighting stock does not take place.

46. Investigations into an accelerated replacement programme of the asset are being undertaken. Funding options including PFI (Private Finance Iniative), PPP (Public / Private Partnership) and additional prudential borrowing are currently being examined by external consultants Deloitte and Derek Rogers Associates on behalf of Derbyshire, Leicestershire and Nottinghamshire County Councils. These options will be considered during 2007.

Risks associated with the lighting asset are highlighted below:

Health and Safety Risks

47. Substandard lanterns

There is a risk associated with sub-standard lanterns in that a lamp – or number of lamps may fail or may not give sufficient lighting to the carriage way. In either case, road and community safety may be compromised.

48. Lighting columns beyond serviceable life waiting for replacement

There are lamp columns which are known to be beyond their serviceable life and are awaiting replacement. There is a risk of structural failure of the column which could risk collapse into the carriageway or footway.

Reputation Risks

49. Lanterns not working / structural failure of a column

Where this service is not provided to a standard to meet public expectation, the Council's reputation will suffer. This is particularly highlighted if there is an incident affecting public health and safety, and wider publicity is often made through the media.

Business Risks

50. Not achieving the legal obligations as Highway Authority

Possible failing in the duty of care in respect of the Highways Act, Health and Safety at Work Act, The Electricity at Work Regulations and The Requirements for Electrical Installations.

51. Not achieving the performance indicators

Failing to meet the national best value performance indicators

52. Not meeting policy standards

Failing to meet County Council own policy and standard objectives.

Cost Risks

53. Increased cost of maintenance/reducing budgets

Increased costs combined with reducing budgets resulting in delayed repairs and renewals and therefore a growing backlog of works to be carried out.

Current Improvement Actions

54. The County Council is currently improving its street lighting service to enable the delivery of goals and objectives by:

- Transfer of asset information to the Map-info Confirm Management System for integration into the overall Highway Asset Management System.
- Revising the NCC Code of Practice for Street Lighting in light of the ILE's new Code of Practice for Street Lighting.
- Surveying the whole the asset stock to obtain new condition information in accordance with the ILE's technical report TR22 to obtain 'Appendix B' inventory data (This condition information will be required by Government for future LTP submissions)
- Developing a risk management model in accordance with the ILE's Street Lighting Code of Practice
- Progressing the programme for replacement of lamp columns that have been assessed as poor, updating the programme in light of revised risk management model
- Improving condition of the street lighting asset to an average age of 20 years
- Evaluating the findings of appointed Consultants who are considering financial options for asset renewals including PFI, PPP and prudential borrowing.
- Achieving improved performance by local DNO for fault repair in line with National indicators
- Reviewing efficiencies in the provision of lighting in response to current increasing energy costs by considering the Institution of Lighting engineers advice note LB1 'Invest to Save' including a part night lighting policy
- Reviewing actions for achieving the aims of the County Council's Carbon Management Plan
- Seeking the input of the Community Safety team for prioritising schemes in relation to achieving the greatest benefit for reducing fear of crime
- Seeking joint procurement of energy with Leicestershire and Derbyshire County Councils

Further Information

55. More detailed information and background details on the various street lighting topic areas will be provided at the request of the Scrutiny Committee. Committee members are invited to consider this report as part of the overall scrutiny of street lighting.

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23rd August 2007

Background papers: Appendix 1.